Successful endoscopic management of gastrointestinal leakages after laparoscopic Roux-en-Y gastric bypass surgery

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Abstract: BACKGROUND: Management of leakages of the gastrojejunal anastomosis after laparoscopic Roux-en-Y gastric bypass (LRYGB) can be complex. New endoscopic techniques such as covered stents and over-the-scope clips (OTCs) have been developed and are valuable alternative therapeutic options to reoperation and drainage. The aim of this study was to compare the value of stents and OTCs with surgical treatment options for the therapy of anastomotic leakages after LRYGB. METHODS: Results of patients who were treated surgically with reoperation, local irrigation and drain placement (n = 9) were compared with results of patients who were treated endoscopically with stent and/or OTC placement (n = 5). Success rate, length of hospital stay, mortality, number of OTC applications/stent placement and percutaneous drainage placements were analyzed. RESULTS: Overall, 14 of 1,046 patients (1.34%) developed a leakage of their gastrojejunal anastomosis after LRYGB between 2000 and 2012. While the success rate in surgically treated patients was 88%, the endoscopic treatment using a sequential approach with stenting, OTC application and percutaneous placement of drainages resulted in a 100% closure rate. The mortality rate and length of stay were not substantially different after both treatment regimens. CONCLUSION: Endoscopic management of anastomotic leakages after LRYGB may constitute a valuable alternative therapeutic option to surgical reoperation and drainage placement.

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Successful Endoscopic Management of Gastrointestinal Leakages after Laparoscopic Roux-en-Y Gastric Bypass Surgery

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Key Words
Bariatric surgery · Gastric bypass · Complications · Endoscopy · Stent · Leakage

Abstract
Background: Management of leakages of the gastrojejunal anastomosis after laparoscopic Roux-en-Y gastric bypass (LRYGB) can be complex. New endoscopic techniques such as covered stents and over-the-scope clips (OTCs) have been developed and are valuable alternative therapeutic options to reoperation and drainage. The aim of this study was to compare the value of stents and OTCs with surgical treatment options for the therapy of anastomotic leakages after LRYGB. ***Methods:*** Results of patients who were treated surgically with reoperation, local irrigation and drain placement (n = 9) were compared with results of patients who were treated endoscopically with stent and/or OTC placement (n = 5). Success rate, length of hospital stay, mortality, number of OTC applications/stent placement and percutaneous drainage placements were analyzed. ***Results:*** Overall, 14 of 1,046 patients (1.34%) developed a leakage of their gastrojejunal anastomosis after LRYGB between 2000 and 2012. While the success rate in surgically treated patients was 88%, the endoscopic treatment using a sequential approach with stenting, OTC application and percutaneous placement of drainages resulted in a 100% closure rate. The mortality rate and length of stay were not substantially different after both treatment regimens. ***Conclusion:*** Endoscopic management of anastomotic leakages after LRYGB may constitute a valuable alternative therapeutic option to surgical reoperation and drainage placement.

Introduction

Bariatric surgery is an effective therapy of morbid obesity and its associated comorbidities such as type 2 diabetes, hypertension, dyslipidemia and obstructive sleep apnea [1–4]. The perioperative complication rate of patients undergoing laparoscopic Roux-en-Y gastric bypass (LRYGB) is low, and the reported anastomotic leakage rate ranges between 1 and 3% [5]. However, consequences of an anastomotic leakage at the level of the gastrojejunostomy can be serious and often result in a markedly extended hospital stay and even an increased mortality rate [6]. Management of anastomotic leakages can often be difficult and technically demanding. Surgical revision of anastomotic leakages is usually limited to

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local irrigation and drain placement due to the present inflammatory tissue, which does not allow a repair of the fistula. Alternatively, a renewal of the gastrojejunostomy may be performed [7]. However, with the development of modern endoscopic devices such as covered stents and over-the-scope clips (OTCs), new therapeutic options have become available, but experience with these devices is still limited [8–11]. Therefore, we retrospectively analyzed the outcome of patients who developed a leak at the gastrojejunal anastomosis after LRYGB and compared the results of surgical and endoscopic treatment strategies.

Material and Methods

Patients and Definitions

Data of 1,046 consecutive patients undergoing an LRYGB from June 2000 to April 2012 were retrospectively analyzed using a prospectively collected database. Patients with anastomotic leakages who received their LRYGB between June 2000 and April 2010 routinely underwent laparoscopic reoperation with either closure of the defect by suture, local irrigation and drainage (n = 7) or renewal of the anastomosis (n = 2). After that, our routine management of leakages at the level of the gastrojejunostomy after LRYGB changed, and we introduced the endoscopic treatment of leakages using sequential or combined application of stents and OTCs. If necessary, additional percutaneous drain placement was performed by interventional radiology (n = 2). Anastomotic leakages at the gastrojejunostomy were diagnosed by upper GI series, computed tomography or upper endoscopy. Outcomes after surgical and endoscopic management were assessed and compared for time between primary LRYGB and diagnosis, patient's characteristics, success rate, time to closure, length of hospital stay and mortality. Time lag from initial procedure (LRYGB) to operative revision defined the closure time in the surgically treated group. Healed leakage was diagnosed endoscopically or by clinical judgment.

Data are presented as mean ± SD, median plus range. Due to the small sample size and distribution, we did not calculate any p values.

Surgery

All LRYGB procedures were performed as described by Wittgrove in 1994. Briefly, a small gastric pouch of approximately 15–25 ml was created and the jejunum divided 50 ml distal to the duodenojejunal flexure. The jejunojejunostomy was performed using a linear stapler. The mesenteric window at the jejunojejunostomy was closed with a non-absorbable suture (Ethibond™). Either an alimentary limb length of 150 cm in the proximal bypass or a common channel of 150 cm in the distal bypass was chosen, depending on the preoperative body mass index. The gastrojejunal anastomosis was performed using a circular stapler (CEEA 25 mm, Tyco, Mansfield, Mass., USA). Reoperations were performed laparoscopically including suturing of the leakage if detected early, drainage and irrigation (n = 7) or renewal of the gastrojejunostomy (n = 2).

Endoscopy

Endoscopies were performed under deep conscious sedation with propofol using Olympus endoscopic instruments (Olympus Medical Systems, Tokyo, Japan). Endoscopy was performed together with the bariatric surgeon in the endoscopy unit or bedside in the ICU.

The OTC device has been comprehensively described by its inventors [12]. The system consists of a clip mounted on the distal tip of the endoscope, which can be released by a thread connected through the working channel to the handwheel of the scope. The nitinol clips are highly elastic and have shape memory. Three different sizes of clips are currently available that when closed will cover lesions up to 2–3 cm in diameter depending on the elasticity of tissue. ERCP cannula catheters together with 0.035-inch guide wires are used to detect and visualize fistula orifices and tracts under fluoroscopy. OTCs were placed with the help of different endoscopic equipment. Simple suction, an anchoring device or specially designed forceps called twin grasper were used to grab tissue around the fistula and pull it into the delivery cap of the OTCs. The choice of instrument was at the discretion of the endoscopist.

All stents were placed over a super-stiff Amplatz (Boston Scientific Corp., Natick, Mass., USA) guide wire either under direct visual control by side-by-side endoscopy or assisted by fluoroscopy. We used the following stent types: Ultraflex partially covered SEMS with a diameter of 23/28 mm and length from 9 to 12 cm (Boston Scientific Corp., Natick, Mass., USA) or Niti-S fully covered MEGA or BETA stent (Taewoong Medical, Korea), which are specially designed for leakages after bariatric surgery. Stents were left in place for 2–3 weeks, and then extracted endoscopically using rat tooth forceps. In the same session, reevaluation of the leak was performed and in case of persistence again treated in the abovementioned manner if technically possible.

Results

In total, 1,046 patients underwent LRYGB between June 2000 and April 2012 in our institution, 14 of which developed a leakage at the level of the gastrojejunostomy. Of these, 9 patients were treated surgically and 5 received endoscopic treatment. Patient characteristics of the two groups are shown in table 1. Surgical treatment consisted of laparoscopic reoperation, defect closure, local irrigation and drain placement (n = 7) or renewal of the gastrojejunostomy (n = 2) and led to successful leak closure in a total of 8 patients (88%). In one patient, however, surgical treatment remained unsuccessful despite a relaparotomy, and the patient died 44 days after the primary operation due to persistent leakage and septicemia.

Endoscopic treatment was performed sequentially and consisted of endoscopic stenting, OTC application and percutaneous placement of drainages if necessary. In total, 6 stents, 10 OTCs and 2 percutaneous drainages were applied sequentially in 5 patients leading to a 100%

Table 1. Patient characteristics

	Surgical group	Endoscopic group
Mean age, years	43.4±10.6	52±11.3
Mean BMI (kg/m^2)	45.8±7.3	37.4±6.5
Number of leakages	9	5
Male/female	6/3	1/4

Values are given as mean ± SD. BMI = Body mass index.

Table 2. Outcomes in patients with leakage of the gastrojejunostomy after surgical treatment (n = 9) and endoscopic treatment (n = 5)

	Surgical group	Endoscopic group
Time to diagnosis, days	4 (1–9)	3 (1–5)
Success rate	8/9 (88%)	5/5 (100%)
Time to closure, days	5 (1–44)	28 (25–58)
Length of hospital stay, days	23 (9–53)	34 (32–41)
Mortality	11%	0%

Time values are expressed as median (range).

success rate. However, as shown in table 2, endoscopic treatment was associated with a substantially longer time to leak closure when compared with surgery (5 vs. 28 days). Furthermore, length of hospital stay was also slightly longer after endoscopic treatment (34 vs. 23 days). The time to diagnosis was comparable in both groups (table 2). The approximated mean cost for a patient without a leakage was USD 26,400. In the case of a leakage at the gastrojejunostomy, the cost increased dramatically to USD 80,900. The average cost of the endoscopic treatment per patient including stents and OTC was USD 10,560.

Discussion

The reported incidence of gastrojejunal leakages after LRYGB has been reported to range between 1 and 3% [5]. The management of leakages in obese patients after LRYGB can be complex and technically demanding and results in significant morbidity with prolonged hospital stay in most cases [7]. Early detection and successful management of leakages are therefore crucial in order to achieve a beneficial outcome. Our results suggest that an endoscopic therapy approach consisting of stent and OTC placement may be a valuable alternative to surgical intervention in patients with small leakages and adequate drainage. Further, the endoscopic technique seems to be at least equally safe with a similar success rate when compared to the traditional operative management.

We further observed that the time to closure and length of hospital stay were slightly longer in endoscopically treated patients, highlighting possible limitations of the interventional strategy. However, the definition of the time to closure is difficult, and the interpretation of these results should be taken carefully. Our results are comparable to a recently published study summarizing the results of 7 studies including 67 patients whose leakages after LRYGB were treated with self-expandable stents leading to a success rate of 88% [13]. It was further shown that stent migration was a frequent problem in up to 36% of the cases, especially when fully covered self-expanding stents were used under 'benign' circumstances like leaks and fistulas [14], which can be observed in up to 42% of cases. In our series, 2 of 6 stents migrated during the course of treatment as documented by endoscopy or radiography. Stent migration might be explained by differences in stent design, which has to be chosen properly. Nowadays, more sophisticated stent models are available, leading to a greater variety of possible choices. Therefore, a case-oriented, tailored approach appears feasible. For example, the first generation of covered stents was predominantly designed for esophageal placement alone. Over time, specially designed anti-migration specifications were added, and uncovered segments were introduced later on to allow tissue overgrowth and therefore hinder migration. Only recently have stents specifically designed for leaks after bariatric surgery become available, providing better anchoring and coverage of complex leaks at the stapler sites [15].

In our series, we did not observe life-threatening complications of the interventional approach such as formation of abscesses or bleeding. If migrated, stents could be retrieved endoscopically without serious consequences and replaced in the same session.

We are fully aware of the fact that the low number of included patients and the heterogeneous characteristics do not allow any firm conclusion based on the presented results. Thus, the optimal indication and timing of stent and OTC placement still remain unclear and need further investigation.

In conclusion, sequential stent and OTC placement seems to be a valuable therapeutic option for the treat-

ment of acute gastrojejunal leakages after LRYGB in patients with small anastomotic leakages and adequate drainage. The results are comparable to the conventional surgical management. Further experience and studies are needed to gain more evidence.

Disclosure Statement

All authors declare that they have no conflict of interest. P.B. has received training at a company-organized workshop by OVESCO.

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